



PATIENT PRESENTING CLINICAL SIGNS

Murphy Pitek History: Elevated ALT, HGE

SPECIES CBC/Chem findings: ALT 412, BUN 55, HCT 55%, Low PLT 75

Canine

BREED ULTRASONOGRAPHIC EXAMINATION OF THE HEART & ABDOMEN

Wheaton

SEX

Neutered Male

AGE

9 Years

WEIGHT

33.2 Pounds

CANINE CARDIAC PARAMETERS	MR VMAX (m/s)	TR VMAX (m/s)	LA/AO (Boon method)	LA/AO (Heart Base; Swe)	FS (%)	EF (%)	EPSS (cm)
NORMAL PARAMETER	4.5-5.5	<2.7	1.3	<1.6	28-40	40-100	<0.6
PATIENT	--	--	NM	--	50	83	0.1
CANINE CARDIAC PARAMETERS	HR (BPM)	AV VMAX (m/s)	PV MAX (m/s)	BODY WEIGHT (kg)	LA 2D short axis Base view (cm)	LVIDd Avg; 2D and m-mode short axis (cm)	LVIDs Avg; 2D and m-mode short axis (cm)
NORMAL PARAMETER	50-100	0.7-1.7	0.7-1.6				
PATIENT	1.21	1.30	.61	--	2.84	2.77	--

INTERPRETED BY Cardiac Presentation

Eric Lindquist, DMV DABVP, Cert. IVUSS

The cardiac presentation revealed moderate pericardial effusion with significantly irregular mixed hypoechoic junctional right auricular/right ventricular free wall mass, measuring approximately 3.38 cm x 3.0 cm. The mass was invading the right auricular and dorsal right ventricular wall with expansion into the right atrium. Other irregular tissue was noted in the heart base. The left heart was unremarkable with normal volume and contractility. Out flow velocities were fairly normal in this patient.

IMAGING PERFORMED BY

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Urinary System

HOSPITAL NAME

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The **urinary bladder**, trigone, and pelvic urethra presented normal thicknesses and normal tone. The ureters were not visible which is normal. No uroliths or sediment were visualized and anechoic urine was present. No evidence of inflammatory or neoplastic changes were noted. Ureteral papillae were normal. The pelvic urethra was imaged 2.0 cm beyond the cystourethral junction. The residual prostate measured 1.0 cm.

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The **kidneys** revealed largely normal size and structure, corticomedullary definition and ratio (cortex 1/3 of medulla) were essentially maintained with some age-related loss of curvilinear patterns regarding the capsule and C/M junction. The cortices presented largely uniform texture with some increased echogenicity expected for his age patient. Medullary structure differed distinctly from that of the cortex and no evidence of pelvic dilation was present. Slight mineralization was present in the kidneys. The left kidney measured 5.21 cm. The right kidney measured 5.63 cm.

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Adrenal Glands

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PATIENT

Murphy Pitek

Both **adrenal glands** were visualized and recognized as having normal shape, size, position and echogenicity for this breed. The phrenic vasculature, glandular echogenicity and detail were unremarkable. Capsule, cortex, and medullary definition were normal for this age patient. The left adrenal gland measured 1.94 cm x 0.38 cm. The right adrenal gland measured 1.73 cm x 1.12 cm at the cranial pole and 0.6 cm at the caudal pole.

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Spleen

The **spleen** was slightly heterogeneous, uniform. No evident pathology.

BREED

Wheaton

Liver

The **liver** itself was unremarkable with slight coarse architecture. The gallbladder and common bile duct were unremarkable. The hepatic veins and vena cava were dilated consistent with passive congestion pattern. Liver enzyme elevations likely owing to passive congestion and hypoxia.

SEX

Neutered Male

Gastrointestinal

Examination of the **gastrointestinal tract** revealed a stomach and intestine free of stasis, of normal wall thickness, acceptable curvilinear mural detail, and peristaltic activity. Small and large intestine demonstrated normal luminal chyme and stool consistency respectively. No obstructive or overt infiltrative disease was noted. No associated abnormal lymphatic activity was noted.

AGE

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33.2 Pounds

Pancreas

The right limb of the **pancreas** was mildly hypoechoic and slightly irregular. Possible low-grade inflammation, however, the patient was not painful upon imaging of this region. A history of pancreatitis is likely.

INTERPRETED BY

Eric Lindquist, DMV
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ULTRASONOGRAPHIC FINDINGS

- Right auricular/junctional right ventricular free wall mass with pericardial effusion consistent with hemangiosarcoma
- Passive congestion pattern causing minor ascites
- The abdomen is benign other than a mild passive congestion pattern of the liver and pancreatic remodeling (possible low-grade pancreatitis)

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INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Referral for chemotherapeutic intervention such as doxorubicin series for palliative measures +/- pericardial tap if necessary. However, if reduction of the mass is able to occur under chemotherapy, then pericardial tap may not be necessary.

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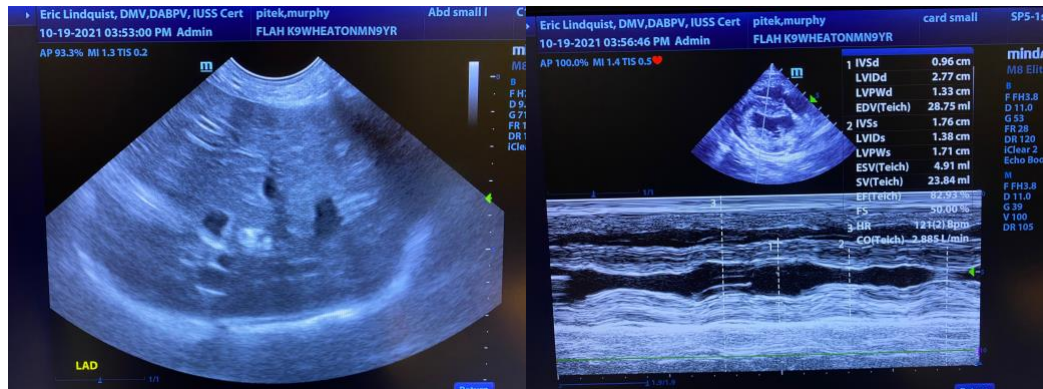
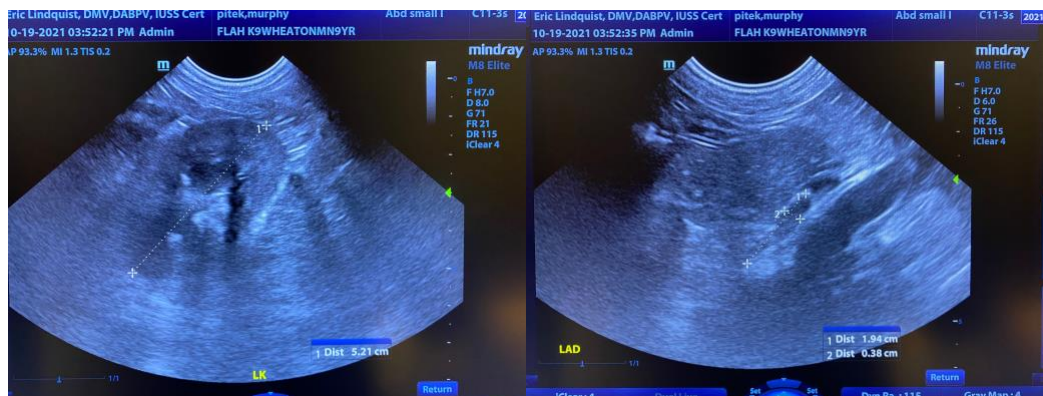
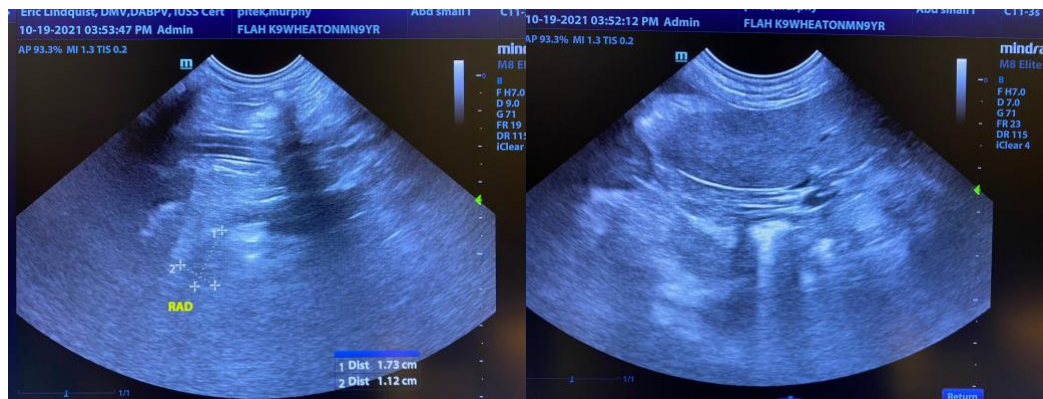
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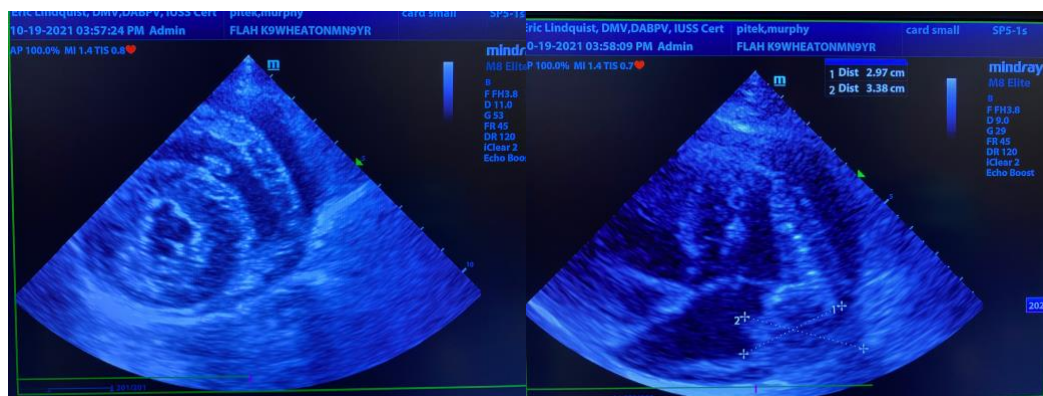
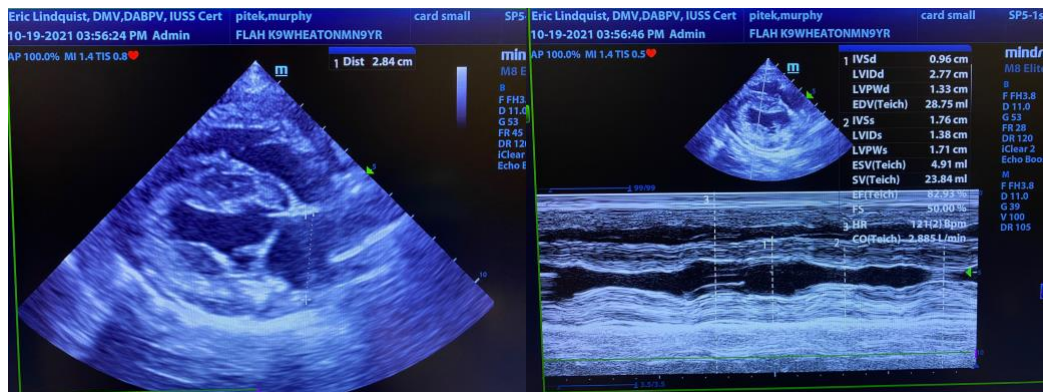
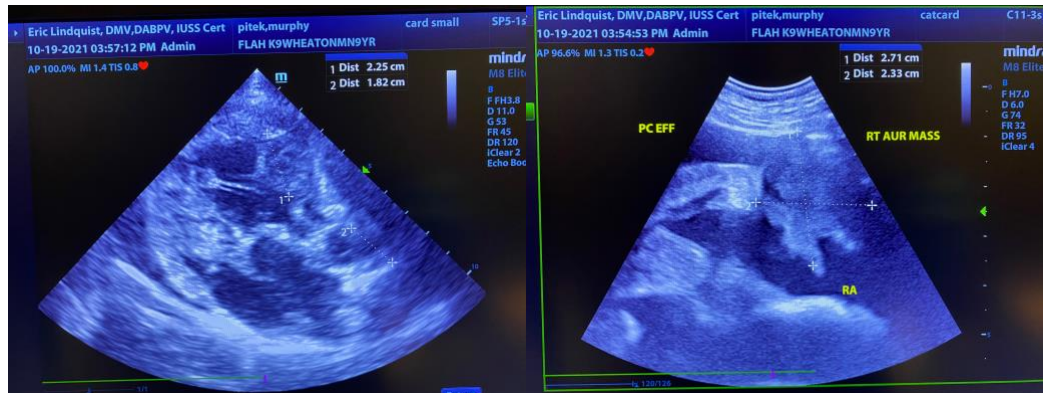
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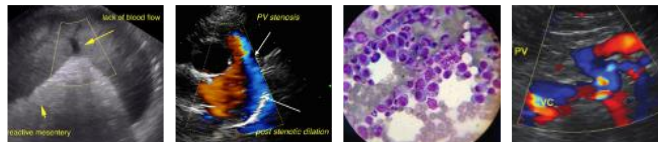
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The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

Thank you for this referral. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance please contact me.

Eric Lindquist, DMV, DABVP, Cert. IVUSS, CEO of SonoPath.com
info@SonoPath.com



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Pericardial Effusion and Cardiac Neoplasia

<http://www.sonopath.com/CardiacNeoplasiaEffusion>

Description: The pericardium is a fibrous sac that encloses the heart and the great vessels—aorta, pulmonary artery, proximal pulmonary veins, and vena cava—located at the heart's base. It is attached caudally to the diaphragm and under normal circumstances contains 1-15 mL of fluid. The latter is comprised of phospholipids that lubricate the heart and allow it to expand and contract without generating friction. The pericardium also fixes the heart, prevents excess motion, and links the diastolic distensibility of the ventricles, thus limiting the degree to which either the left or the right ventricle will distend during diastole. When there are acute changes in venous return (i.e., during exercise), the pericardium plays a critical role in limiting ventricular filling. In cases of chronic cardiac enlargement, the pericardium also becomes distended, and its ability to limit ventricular filling, especially when the heart is at rest, becomes compromised. Pericardial tamponade occurs when there is a rapid accumulation of fluid and the pressure inside the pericardium increases significantly. With tamponade, ventricular filling is restricted and cardiac output is decreased. The right atrium and ventricle are the most vulnerable to this condition as these compartments have thinner walls and a lower pressure.

Etiology: Causes of pericardial effusion include:

- Neoplasia
 - Right atrial (RA) hemangiosarcoma
 - Heart base (aortic body) tumors
 - Mesothelioma
 - Rhabdomyosarcoma
 - Ectopic thyroid carcinoma
 - Metastatic neoplasia
- Idiopathic
- Congestive heart failure
- Peritoneal-pericardial diaphragmatic hernia
- Pericardial cyst
- Hypoalbuminemia
- Infectious pericarditis (bacterial, *Coccidioides immitus*)
- Feline infectious peritonitis
- Left atrial tear secondary to valvular disease
- Coagulopathy

The majority of neoplastic masses consist of hemangiosarcoma and heart-based tumors (chemodectomas or ectopic thyroid adenocarcinoma). Idiopathic pericardial effusion is a diagnosis of exclusion; the effusion is typically hemorrhagic. Approximately 50% of dogs will be cured with a single pericardiocentesis, while some dogs will require multiple pericardiocenteses as well as surgery. A peritoneal-pericardial diaphragmatic hernia is a congenital hernia seen in dogs and cats in which the abdominal contents (i.e.,



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liver, small intestine, spleen, stomach) herniate into the pericardial sac. Constrictive pericarditis is an uncommon condition in which a non-distensible, thickened, fibrotic pericardium develops over time.

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Canine

Clinical Signs: One will observe the following clinical signs, which often present in combination: ascites, lethargy, exercise intolerance, pale mucous membranes, weak pulses, *pulsus paradoxus*, and respiratory distress.

BREED

Wheaton

Diagnostics: Survey radiographs will reveal hepatomegaly, cardiomegaly (generalized or sectorial globoid), and small pulmonary vessels. Pulmonary edema is typically not found, although one may discover concurrent pulmonary metastatic disease. An ECG will show electrical alternans or small complexes, but often the changes are very subtle and difficult to detect.

SEX

Neutered Male

AGE

9 Years

Echocardiography is usually considered the gold standard for diagnosing pericardial effusion. Findings include:

WEIGHT

33.2 Pounds

- Anechoic space between the heart and the pericardium.
- Abnormal side-to-side cardiac motion.
- Decreased chamber size (right ventricle [RV] and left ventricle [LV]).
- Presence of a pericardial or cardiac mass.
- Tamponade with early diastolic RA and RV collapse.

INTERPRETED BY

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Cytology is helpful in the diagnosis of lymphoma, septic pericarditis, and idiopathic effusion, but not in cases of neoplasia.

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According to a study that found troponin I levels to be higher in dogs with neoplastic pericardial effusion, the cardiac troponin I assay can be helpful in the diagnosis hemangiosarcoma.

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Prognosis:

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- Cardiac hemangiosarcoma: < 8 months with surgical debulking and chemotherapy.
- Chemodectoma (aortic derived): MST 730 days post pericardectomy.
- Idiopathic: 50% complete resolution post cardiocentesis; curative with pericardectomy, which can be done via thoracotomy, or thoracoscopy, or using a balloon to tear the pericardium.
- Mesothelioma: Poor.
- Restrictive pericarditis: Poor, especially when the pericardium has not been surgical stripped.

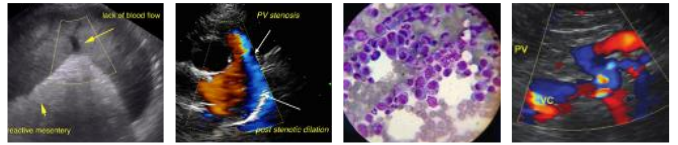
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Murphy Pitek Cagle LA, Epstein SE, Owens SD, et al. Diagnostic yield of cytology analysis of pericardial effusion in dogs. *J Vet Int Med* 2014;28:66-71.

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Wheaton Jackson J, Richter KP, Launer DP. Thoroscopic partial pericardectomy in 13 dogs. *J Vet Int Med* 1999;13:529-33.

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Neutered Male Johnson MS, Martin M, Binns S. A retrospective study of clinical findings, treatment and outcome in 143 dogs with pericardial effusion. *J Small Anim Prac* 2004;45:546-52.

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9 Years Kienle RD, Thomas WP. Echocardiography. In: Nyland TG and Mattoon JS, eds. *Small Animal Diagnostic Ultrasound, 2nd ed.* Philadelphia, PA: WB Saunders; 2000:354-423.

WEIGHT

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